

FOREWORD

BY THE NODYCON 2025 CO-CHAIRS

Welcome to the Fourth International Nonlinear Dynamics Conference (NODYCON 2025)!

Following the successful editions of NODYCON in 2019, 2021, and 2023 held in Rome, this year's conference marks the first edition hosted in the United States, at Stevens Institute of Technology in Hoboken, New Jersey under the auspices of the International Nonlinear Dynamics Society (NODYS). NODYCON continues the legacy of the Nonlinear Vibrations, Stability, and Dynamics of Structures Conference series initiated in 1986 at Virginia Tech by the late Prof. Ali H. Nayfeh, a pioneering figure in the field and founder of the journal *Nonlinear Dynamics*.

NODYCON 2025 is co-chaired by Prof. Walter Lacarbonara of Sapienza University of Rome and by Prof. Muhammad Hajj, Chair of Civil, Environmental, and Ocean Engineering at Stevens and long-time collaborator of Prof. Nayfeh. This edition features a dynamic scientific and social program including several keynote lectures, topical lectures, a panel on AI and nonlinear dynamics, thematic oral sessions that highlight the most recent advancements in nonlinear dynamics. A major innovation this year is NODYCON 2025 Virtual, a parallel online event held from June 23 to 25, enabling broader participation from the global nonlinear dynamics community.

We are proud to continue supporting excellence across all career stages. In addition to the Springer Ali H. Nayfeh Awards for the best student papers, this edition supports again two major distinctions: the Springer Ali H. Nayfeh Senior Award, recognizing exceptional mid- or late-career contributions in research, education, and leadership in nonlinear dynamics, and the NODYS Early Career Award, honoring outstanding achievements and a strong trajectory in the early stages of a research career.

The call for papers attracted outstanding international engagement. After a rigorous review process involving external referees and program committees, hundreds of contributions were selected for oral presentations. These cover a diverse range of topics from data-driven methods, metamaterials, and nonlinear control to network dynamics, presented across eight in-person and five online parallel sessions.

We are pleased to report that over 140 full papers have been submitted for publication in *Advances in Nonlinear Dynamics – Proceedings of the Fourth International Nonlinear Dynamics Conference (NODYCON 2025)*. These proceedings, published by Springer Nature, will be indexed in leading databases including Web of Science, Scopus, and EI.

The continued success of NODYCON is driven by the dedication and enthusiasm of researchers worldwide. We extend our heartfelt thanks to the Organizing, Program, Steering, and International Advisory Committees, as well as to the many external reviewers for their invaluable contributions.

We also gratefully acknowledge the support of Stevens Institute of Technology, NODYS, Sapienza University of Rome and our sponsor Springer Nature.

We hope you enjoy an inspiring and memorable experience at NODYCON 2025, whether attending in person or online. Let us also remember that NODYCON is more than a scientific conference; it is

a space to connect, build friendships, and foster meaningful human interactions that extend beyond research, for a better, more collaborative world.

Walter Lacarbonara and Muhammad Hajj
Co-Chairs, NODYCON 2025
June 2025

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NODYCON 2025 Awards

NODYCON 2025 features three types of awards.

- The Ali H. Nayfeh Prizes (1st, 2nd, and 3rd Prize), in honor of Nonlinear Dynamics's founding editor, the late Professor Ali H. Nayfeh, supported by Springer for the best papers presented by graduate students at NODYCON 2025.
- The Ali Nayfeh Senior Award jointly supported by Springer and NODYS
- The Early Career Award supported by the NODYS Society.

The Award committee for the Ali H. Nayfeh Prizes includes:

- Prof. Americo Barbosa da Cunha J., Universidade do Estado do Rio de Janeiro, Brasil
- Prof. D. Dane Quinn, The University of Akron, USA
- Prof. D. Olivier Thomas, Conservatoire National des Arts et Metiers, France.

The Award committee for the Ali Nayfeh Senior Award and the Early Career Award Includes:

- Prof. Paulo Batista Gonçalves, Pontifícia Universidade Católica do Rio de Janeiro, Brasil
- Prof. Muhammad Hajj, Stevens Institute of Technology, USA
- Prof. Fabrizio Vestroni, Sapienza University of Rome, Italy.



Ali H. Nayfeh, Professor Emeritus of Nonlinear Dynamics,
21 December 1933 – 27 March 2017

ALI H. NAYFEH PRIZES

The evaluation criteria for the Ali H. Nayfeh Prizes were based on the quality of the written paper, with particular emphasis on novelty, achievement, and potential impact. Eligible papers were submitted to the NODYCON 2025 Special Issue of Nonlinear Dynamics or to the NODYCON 2025 Springer Proceedings. We are pleased to announce the recipients of the Ali H. Nayfeh Prizes for 2025:

1st Place – Pritam Ghoshal

*For the paper "Exploiting Bistability and Viscoelasticity in Reservoir Computing",
co-authored with James Gilbert and Anil Bajaj.*

2nd Place – Soumyabrata Maiti

*For the paper "Effect of Friction and Stiffness Nonlinearity on Vibrations of a Disc Brake Caliper and Its Control Prospects",
co-authored with Anish Kumar and Hussain Kanchwala.*

3rd Place – Elena Rybalova

*For the paper "Peculiarities and Synchronization of Randomly Interlayer Coupled Networks of Chaotic Maps",
co-authored with Vladislav Averyanov and Galina Strelkova.*

ALI H. NAYFEH SENIOR AWARD & NODYS EARLY CAREER AWARD

The Nonlinear Dynamics Society (NODYS) solicited nominations for the Ali H. Nayfeh Senior Award and the NODYS Early Career Award.

The Senior Ali H. Nayfeh Award was established to recognize exceptional impact of research contributions and education of researchers and/or practitioners, and general leadership in advancing the field, attracted outstanding nominations.

The 2025 Ali H. Nayfeh Senior Award is jointly awarded to:

- **Prof. Giuseppe Rega**, Sapienza University of Rome
- **Prof. Fabrizio Vestroni**, Sapienza University of Rome

in recognition of Prof. Rega's *seminal contributions to the field of nonlinear dynamics that have shaped international research and academic programs and collaborative networks;*

in recognition of Prof. Vestroni's *influential career in academia, research and professional practice that advanced structural design and analysis by emphasizing nonlinear dynamics.*

The 2025 NODYS Early Career Award is awarded to:

Prof. Amal Z. Hajjaj, Loughborough University

in recognition of her *significant contributions to the development of miniaturized sensors with exceptional capabilities rooted in exploiting nonlinear phenomena.*

NODYCON 2025 VIRTUAL AT A GLANCE

	8:45 AM	9:15 AM	9:50 AM	10:30 AM	11:00 AM	11:35 AM	12:10 PM	1:45 PM	3:15 PM	4:00 PM 5:45 PM
MONDAY, June 23	Zoom plenary Opening 	Zoom plenary Keynote #1 	Zoom plenary Panel 	Coffee break 	Zoom plenary Keynote #2 	Zoom plenary Keynote #3 	Lunch 	Zoom room 1 <i>Analytical Techniques</i> Zoom room 2 <i>Mechanical Systems and Smart Materials I</i> Zoom room 3 <i>Small-scale Robots</i> Zoom room 4 <i>Robots Dynamics and Control I</i> Zoom room 5 <i>Artificial Intelligence & Machine Learning I</i>	Coffee break 	Zoom room 1 <i>Mechanical Systems and Structures I</i> Zoom room 2 <i>Mechanical Systems and Structures II</i> Zoom room 3 <i>Mechanical Systems and Structures III</i> Zoom room 4 <i>Mechanical Systems and Smart Materials II</i>

	8:45 AM	9:20 AM	10:00 AM	10:45 AM	12:00 PM	1:30 PM 3:30 PM
TUESDAY, June 24	Zoom plenary Keynote #4 	Zoom plenary Keynote #5 	Coffee break 	Zoom room 1 <i>Chaotic Systems and Uncertainty</i> Zoom room 2 <i>Artificial Intelligence and Machine Learning II</i> Zoom room 3 <i>Metamaterials</i> Zoom room 4 <i>Multifunctional Structures</i> Zoom room 5 <i>Topical Lecture #1</i> <i>Robot Dyn. and Control II</i>	Lunch 	Zoom room 1 <i>Nonlinear Vibration Control</i> Zoom room 2 <i>Nonlinear PDEs and ODEs</i>

	8:45 AM	9:15 AM	9:45 AM	10:15 AM	11:00 AM	12:30 PM	1:45 PM	2:30 PM 3:00 PM
WEDNESDAY, June 25	Zoom plenary Keynote #6 	Zoom plenary Keynote #7 	Zoom plenary Keynote #8 	Coffee break 	Zoom room 1 <i>Bio/eco-systems Dynamics</i> Zoom room 2 <i>Mechanical Systems and Structures IV</i> Zoom room 3 <i>Robot Dynamics and Control III</i> Zoom room 4 <i>Mechanical Systems and Structures V</i> Zoom room 5 <i>Mechanical Systems and Structures VI</i>	Lunch 	Zoom plenary NODYS General Assembly 	Zoom plenary Closing Ceremony 

PLENARY PROGRAM

SUNDAY – June 22, 2025

01:00 PM – 05:00 PM EDT (Eastern Daylight Time)

REGISTRATION , BABBIO CENTER

05:00 PM – 08:30 PM EDT (Eastern Daylight Time)

WELCOME RECEPTION, BABBIO CENTER

MONDAY – June 23, 2025

<https://zoom.us/j/98220188178>

07:30 AM – 08:30 AM EDT (Eastern Daylight Time)

CONTINENTAL BREAKFAST

8:45 AM – 9:15 AM EDT (Eastern Daylight Time)

OPENING CEREMONY

9:15 AM – 9:50 AM EDT (Eastern Daylight Time)

**A RETROSPECTIVE AND PROSPECTIVE
JOURNEY THROUGH NONLINEAR
DYNAMICS IN MECHANICS**
PROF. GIUSEPPE REGA

9:50 AM – 10:30 AM EDT (Eastern Daylight Time)

**PANEL ARTIFICIAL INTELLIGENCE AND
NONLINEAR DYNAMICS: MODELING
COMPLEXITY WITH INTELLIGENCE**
RANDY SOPER, BRENDAN ENLOT, C
NATARAJ, BALAKUMAR BALACHANDRAN

10:30 AM – 11:00 AM EDT (Eastern Daylight Time)

COFFEE BREAK

11:00 AM – 11:35 AM EDT (Eastern Daylight Time)

**SYNCHRONIZATION IN NETWORKS OF
NONLINEAR SYSTEMS: A MODULAR
ANALYSIS AND DESIGN PERSPECTIVE**
N. VAN DE WOUW

11:35 AM – 12:10 PM EDT (Eastern Daylight Time)

**EMULATING NONLINEAR DYNAMICS IN
HARDWARE-IN-THE-LOOP
ENVIRONMENTS**
GÁBOR STÉPÁN

12:10 PM – 01:45 PM EDT (Eastern Daylight Time)

LUNCH BREAK

TUESDAY – June 24, 2025

<https://zoom.us/j/97103264067>

07:30 AM – 08:30 AM EDT (Eastern Daylight Time)	CONTINENTAL BREAKFAST
8:45 AM – 9:20 AM EDT (Eastern Daylight Time)	AN EXAMINATION OF BISTABLE VISCOELASTIC STRUCTURES ANIL K. BAJAJ
9:20 AM – 9:55 PM EDT (Eastern Daylight Time)	VIBRATIONAL CONTROL: A MYSTERIOUS STABILIZATION MECHANISM IN INSECTS FLIGHT HAITHAM TAHA
10:00 AM – 10:45 AM EDT (Eastern Daylight Time)	COFFEE BREAK
12:00 PM – 13:30 AM EDT (Eastern Daylight Time)	LUNCH BREAK
06:00 PM – 10:00 PM EDT (Eastern Daylight Time)	BOAT TOUR, BANQUET & AWARDS CEREMONY

WEDNESDAY – June 25, 2025

<https://zoom.us/j/92111942108>

07:30 AM – 08:30 AM EDT (Eastern Daylight Time)	CONTINENTAL BREAKFAST
08:45 AM – 09:15 AM EDT (Eastern Daylight Time)	NONLINEAR CONTROL OF A SPACE ROBOT FOR FAST TRACKING POSE TRAJECTORIES HAIYAN HU
09:15 AM – 09:45 AM EDT (Eastern Daylight Time)	VIBRATION ENERGY MANIPULATION THROUGH ACOUSTIC BLACK HOLE LI CHENG
09:45 AM – 10:15 AM EDT (Eastern Daylight Time)	REDUCED-ORDER MODELING IN STRUCTURAL DYNAMICS USING NONLINEAR NORMAL MODES CYRIL TOUZÉ
10:15 – 11:00 EDT (Eastern Daylight Time)	COFFEE BREAK
12:30 PM – 01:45 PM EDT (Eastern Daylight Time)	LUNCH BREAK
01:45 PM – 02:30 PM EDT (Eastern Daylight Time)	NODYS GENERAL ASSEMBLY MEETING https://zoom.us/j/98037942079
02:30 PM – 03:00 PM EDT (Eastern Daylight Time)	CLOSING CEREMONY https://zoom.us/j/98037942079

KEYNOTES (ONLINE)

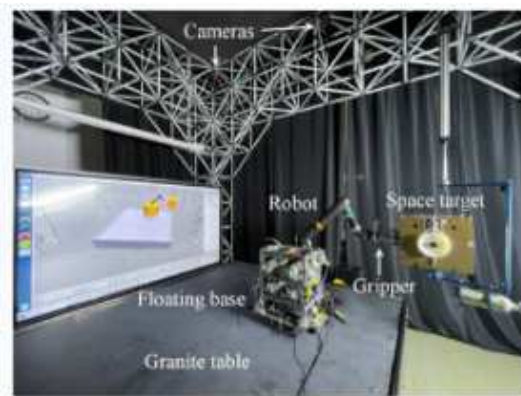
NONLINEAR CONTROL OF A SPACE ROBOT FOR FAST TRACKING POSE TRAJECTORIES

08:45 AM – 09:15 AM EDT (Eastern Daylight Time)
UCC Tech Complex

Haiyan Hu

School of Aerospace Engineering, Beijing Institute of Technology

Future space missions are calling for ultra-large space structures assembled on orbit by space robots. It is challenging to control flying space robots in such assembly due to the nonlinear dynamic coupling between robots and their floating base.



This lecture presents how to use Lie group structure of a robot configuration and to formulate the system momentum evolution equations. Then, it gives the design of manifold model predictive controller to solve a three-dimensional pose trajectory tracking problem. Furthermore, it presents the performance of the above controller in numerical simulations, emphasizing the momentum shaping and prediction horizon selection. Finally, the lecture demonstrates the trajectory tracking and object capturing experiments in a three-dimensional space via an air-bearing space robot simulator.

BIO-SKETCH OF HAIYAN HU



Dr. Haiyan Hu is The Chair Professor of Mechanics at Beijing Institute of Technology, China. He served as President of BIT from 2007 to 2017, President of Nanjing University of Aeronautics and Astronautics from 2001 to 2007, and President of The Chinese Society of Theoretical and Applied Mechanics from 2010 to 2014. He has made recognized contributions to the nonlinear dynamics of controlled mechanical systems, the unfolding dynamics of large space structures on orbit, and the flutter control of aircraft structures. As such, he received The State Award of Natural Sciences twice in 2006 and 2012, and many honors, including Fellow of Chinese Academy of Sciences in 2007, Fellow of the World Academy of Sciences in 2010, Honorary Member of Hungary Academy of Sciences in 2022, Honorary Doctor of Moscow State University in 2015, and ASME Thomas Caughey Dynamics Award in 2023.

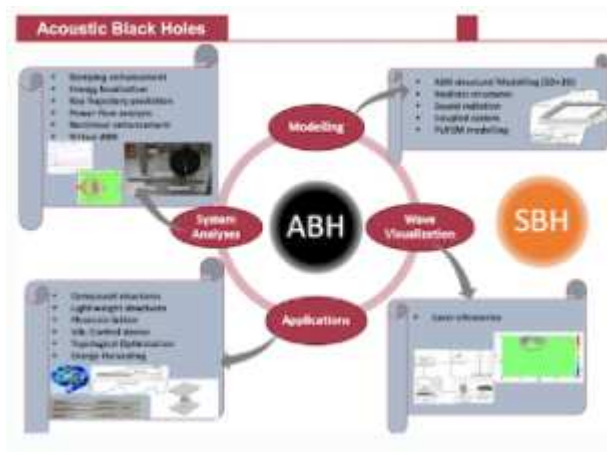
VIBRATION ENERGY MANIPULATION THROUGH ACOUSTIC BLACK HOLE EFFECT ENHANCED BY NONLINEAR ELECTROMECHANICAL COUPLING

09:15 AM – 09:45 AM EDT (Eastern Daylight Time)
UCC Tech Complex

Li Cheng

Department of Mechanical Engineering
The Hong Kong Polytechnic University

Energy manipulation in vibrating structures is critical for numerous engineering applications such as vibration mitigation, structural sound control and energy harvesting. Wave retarding structures, exemplified by acoustic black hole (ABH) structures, offer a promising solution. ABH features the slow wave effect inside a structure with reducing thickness, which entails non-reflective wave propagation of flexural waves and energy trapping.



These properties, however, are limited to the high frequency range above the so-called cut-on frequency. To address this deficiency in linear system design, this talk discusses the option of introducing intentional electromechanical coupling into an ABH structure via surface-coated PZT patches with nonlinear electrical shunts or grounded cables. The target outcome is to produce effective electro-mechanical coupling and cross-frequency energy transfer, thus improving the low frequency benefits of the ABH. Numerical modelling, salient phenomena and the potential of the technique for vibration mitigation is discussed using

beam examples.

BIO-SKETCH OF LI CHENG



Dr. Li Cheng is Chair Professor and Associate Dean (Research) of the Faculty of Engineering at Hong Kong Polytechnic University and Director of the Consortium for Sound and Vibration Research (CSVVR). He earned his Ph.D. from INSA-Lyon, France, and previously held a faculty position at Laval University, Canada, before joining PolyU in 2000. He is Deputy Editor-in-chief of the Journal of Sound and Vibration and serves as Associate Editor for several top journals, including Nonlinear Dynamics and Structural Health Monitoring. A Fellow of multiple prestigious societies, including the Royal Society of Canada and IIAV, he is currently President-elect of the International Institute of Noise Control Engineering (I-INCE).

REDUCED-ORDER MODELING IN STRUCTURAL DYNAMICS USING NONLINEAR NORMAL MODES

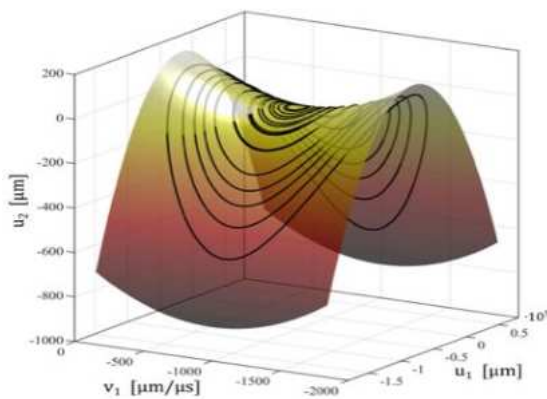
09:45 AM – 10:15 AM EDT (Eastern Daylight Time)
UCC Tech Complex

Cyril Touzé

ENSTA Paris, Institut Polytechnique de Paris

Institute of Mechanical Science and Industrial Applications (IMSIA)

Nonlinear Normal Modes (NNMs) defined as invariant manifold in the phase space, have been used since the 1990s in order to derive efficient and accurate reduced-order models (ROMs) in structural dynamics. In this tutorial presentation, NNMs will be defined in the light of the latest developments.



In particular, it will be shown how the parametrisation method for invariant manifolds allows unifying definitions, as well as offering a framework for automated high-order computations, that can be directly applied to Finite Element models. Applications in structural dynamics with distributed geometric nonlinearity will be highlighted and recent developments considering the coupling with different physical phenomena occurring e.g. in Micro-Electro Mechanical Systems (MEMs), or the consideration of a varying parameter in the method to tackle bifurcating systems, will be demonstrated.

BIO-SKETCH OF CYRIL TOUZÉ



Cyril Touzé earned his PhD in 2000 from Pierre and Marie Curie University, Paris, focusing on musical acoustics and nonlinear vibrations in gongs and cymbals. Currently a professor at ENSTA Paris, his research encompasses geometric nonlinearity in plates and shells, reduction methods using nonlinear normal modes and normal form theory, and vibration mitigation through nonlinear absorbers and acoustic black holes. He has developed advanced models for sound synthesis of gongs and cymbals and explored wave turbulence in plate vibrations. Recently, he has applied the parameterization method for invariant manifolds to model order reduction, utilizing NNMs for MEMs and aerospace FEM applications.

MONDAY JUNE 23, 2025

PARALLEL SESSIONS

DAY 1 – Monday, June 23, 2025		01:45 pm – 03:15 pm
ANALYTICAL TECHNIQUES		ZOOM ROOM 1 https://zoom.us/j/96335750271
Chairs: Roberto De Leo, Jithu Paul		
Matthew P. Cartmell Jenna Downie	Towards a High-Performance Software Implementation of Symbolic Computational Dynamics	01:45 pm – 02:00 pm
Gabriel Araujo Flavio Marques Walter Lacarbonara	Beam vibration mitigation via rotary Nonlinear Energy Sink	02:00 pm – 02:15 pm
Jithu Paul Karel van Dalen Andrei Faragau Rens van Leijden Andrei Metrikine	Suppression of parametric resonance using parametric force in a Hyperloop system	02:15 pm – 02:30 pm
Abhishek Sharma Pankaj Wahi	Modal Interactions in Strings Vibrating against Curved Obstacles at Both Ends: Influence of the Relative Curvature	02:30 pm – 02:45 pm
Roberto De Leo	The Graph of a Dynamical System	02:45 pm – 03:00 pm
Yilin Li Jianliang Huang Weidong Zhu	Enhancing Computational Efficiency and Convergence of the Incremental Harmonic Balance Method for Periodic Responses of a Nonsmooth Geared Rotor-Bearing System	03:00 pm – 03:15 pm
MECHANICAL SYSTEMS AND SMART MATERIALS 1		ZOOM ROOM 2 https://zoom.us/j/92925875684
Chairs: Giulia Lanzara		
Ginevra Hausherr Krishna Chytanya Chinnam Alessandro Porrari Giulia Lanzara	Exploring Nonlinear Effects in Electrospun Nanoweb Acoustic Sensors	01:45 pm – 02:00 pm
Chongan Wang Alper Erturk	Programmable Solitons in an Electromechanical Metamaterial Obeying the Nonlinear Schrödinger Equation via Duffing Shunts	02:00 pm – 02:15 pm
Dongfei Huo Wufeng Cai Xijin Hua	Comparison of Knee Joint Reaction Forces and Kinematics in Children with Cerebral Palsy and Typically Developing Individuals	02:15 pm – 02:30 pm
Guangming Xue Yunzhe Qiu	Simplification method for the dynamic model of the giant magnetostrictive actuator	02:30 pm – 02:45 pm
Paulomi Mukherjee A. Arockiarajan Shaikh Faruque Ali	Comparative Analysis of Energy Harvesting from Hybrid Bistable Symmetric Laminates Using Piezoelectric Patches	02:45 pm – 03:00 pm
Kartik Tandel B Rammohan V Shrikanth GK Suryanarayana DB Singh	Limit cycle oscillation of Nitinol embedded laminate beam: Experimental insight into geometric and material nonlinearity	03:00 pm – 03:15 pm

DAY 1 – Monday, June 23, 2025

01:45 pm – 03:15 pm

SMALL-SCALE ROBOTS 1

ZOOM ROOM 3

<https://zoom.us/j/92894631639>

Chairs: Yang Liu, Tian Qiu, Marek Balcerzak

Guangming Cui Zhenping Yu Xianrui Zhang Juntian Qu	Independent Control of Multiple Microrobots Based on Coil Array Magnetic Actuation System	01:45 pm – 02:00 pm
Zilin Yang Guo Zhan Lum	Magnetic miniature soft robot with reprogrammable drug-dispensing functionalities: towards advanced targeted combination therapy	02:00 pm – 02:15 pm
Marek Balcerzak Sandra Zarychta Jerzy Wojewoda	Fourier series-based algorithm for control optimization in pendulum capsule drive: an experimental study	02:15 pm – 02:30 pm
Qiu Yin Zhichao Ma	Acoustic micro-manipulation for cellular assembly	02:30 pm – 02:45 pm
Jiyuan Tian Moon Kwang Jeong Tian Qiu	Numerical Modeling of a Transformable Twisting Milli-Robot for Propulsion in Viscous Fluids	02:45 pm – 03:00 pm
Ali K. hoshiar	AI-Driven Design and Control of Tethered-to- Swarm Miniaturized Robots	03:00 pm – 03:15 pm

ROBOT DYNAMICS AND CONTROL 1

ZOOM ROOM 4

<https://zoom.us/j/98800811013>

Chairs: Ali K. Hoshiar, Yao Yan

Xizheng Fang Yang Liu Halim Alwi Shyam Prasad	An Effective Capsule Propulsion Method Using a High-Power Electromagnetic Coil with an Iron Core	01:45 pm – 02:00 pm
Tianle Ma Halim Alwi Christopher Edwards	Bio-Inspired Small UAV: Nonlinear Modelling and Simulation	02:00 pm – 02:15 pm
Jiajun Zhang Shu Zhang	Period Motion Tracking of Lower Limb Exoskeleton: A New Time-independent Control Approach	02:15 pm – 02:30 pm
Jie Tang	Research on predefined-time control of attitude pointing for parallel mechanism	02:30 pm – 02:45 pm
Zhang Jiacheng Zigen Song	Motion Control and Actuation Strategy for a Three-Bar Tensegrity Robot	02:45 pm – 03:00 pm
Tianyi Sun Yao Yan	Optimization and evaluation of lower limb exoskeleton based on human-exo coupling dynamics	03:00 pm – 03:15 pm

DAY 1 – Monday, June 23, 2025

01:45 pm – 03:15 pm

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING I

ZOOM ROOM 5

<https://zoom.us/j/92586494678>

Chairs: Jie Yuan, Peiyu Wang

Vikram Ramanan Anusai Ramankutty Sharan Sreedeeep Satyanarayan Chakravarthy	Understanding non-linearity in unsteady pressure during thermo-acoustic instability through sparse forecasting using Gaussian process regression and variational auto-encoder	01:45 pm – 02:00 pm
Kenneth Omokhagbo Afebu Yang Liu Evangelos Papatheou Shyam Prasad	Towards early bowel cancer detection: A data driven dynamic method of lesions characterisation using a robotic capsule	02:00 pm – 02:15 pm
Michael mcgurk Jie Yuan	Multi-fidelity Data Driven Bayesian Identification of Complex Aeroelastic Systems	02:15 pm – 02:30 pm
Harrish Joseph Biagio Carboni Giuseppe Quaranta Walter Lacarbonara	Nonlinear Dynamic Modeling of Duffing Oscillators Using Fourier Neural Operators	02:30 pm – 02:45 pm
Peiyu Wang Jie Yuan David Toal	Multi-fidelity surrogate model prediction for nonlinear dynamic system performance	02:45 pm – 03:00 pm

DAY 1 – Monday, June 23, 2025**04:00 pm – 05:45 pm****MECHANICAL SYSTEMS AND STRUCTURES I****ZOOM ROOM 1**<https://zoom.us/j/93827156404>

Chairs: Laura Ruzziconi, Csaba Budai

Javier M. Zaraza Espinosa Vipin Agarwal	Dynamic Responses of Parameter-Tuned Nonlinear Oscillator Arrays Under Harmonic Excitation	04:00 pm – 04:15 pm
Csaba Budai	On the Effect of Dry Friction-Induced Limit Cycles in the Dynamics of Sampled-Data Linear Systems with Viscous Damping	04:15 pm – 04:30 pm
Laura Ruzziconi Amal Z. Hajjaj	Diverse Response Patterns in Combination Internal Resonances of Hybrid-Shaped MEMS	04:30 pm – 04:45 pm
Ahmed A. Barakat Peter Hagedorn	Nonlinear ring resonating micro-gyroscopes: bifurcation study and parametric driving	04:45 pm – 05:00 pm
Larysa Dzyubak Jan Awrejcewicz	Simulation of the Piezoelectric Hysteresis Effects in Ultrasonic Motors Using Models with Masing–Bouc–Wen’s Structure	05:00 pm – 05:15 pm
Salvatore Caddemi Ilaria Fiore Francesco Cannizzaro Ivo Caliò	Forced Vibrations of Multi-Cracked Shear Deformable Beams by Means of Extended Modal Analysis	05:15 pm – 05:30 pm
Shabnam Tashakori Zahra Jafari Shahbazzadeh Vahid Vaziri Andres San-Millan Sumeet S. Aphale	Prediction-based Pole-placement Control for the Nanopositioning System	05:30 pm – 05:45 pm

MECHANICAL SYSTEMS AND STRUCTURES II**ZOOM ROOM 2**<https://zoom.us/j/92925875684>

Chairs: Tieding Guo

Fangyan Lan Tieding Guo	Non-Monotonic (Mixed Hardening/Softening) Dynamics in Nonlinear Structures	04:00 pm – 04:15 pm
Fahd Bin Abdul Hasis Praveen Krishna R Vinayaravi Ben Jacob	Transient Rotordynamic Modelling using Pseudo Spectral Method with Experimental Validation on an Overhung Rotor	04:15 pm – 04:30 pm

Shivendra Nandan Divyansh Sharma Atul Kumar Sharma	Anisotropic Effects on the Nonlinear Dynamics of the Hard-Magnetic Soft Actuators	04:30 pm – 04:45 pm
Saber EL AREM	A Smooth and Nonlinear Switching Crack for Rotor Dynamics Analysis	04:45 pm – 05:00 pm
Manoj Prabhakar Senthil Murugan	Parametric instabilities of camber morphing wing structure with time-varying stiffness	05:00 pm – 05:15 pm
Debashis Singha Senthil Murugan	Morphing Aeroelasticity of UAV Wing with Sliding Telescope Dynamics and Unsteady Aerodynamics	05:15 pm – 05:30 pm
Pramod Kumar Verma V Shrikanth	Shock Response Spectrum of Linear Viscous and Nonlinear Discontinuous Coulomb Damping	05:30 pm – 05:45 pm

DAY 1 – Monday, June 23, 2025

04:00 pm – 05:45 pm

MECHANICAL SYSTEMS AND STRUCTURES III

ZOOM ROOM 3

<https://zoom.us/j/92155682888>

Chairs: Ashu Sharma, Roy Choudhury

Attilio Frangi Alessio Colombo Alessandra Vizzaccaro Cyril Touzé	Reduced Order Modelling of Fully Coupled Electro-Mechanical Systems Through Invariant Manifolds with Applications to Microstructures	04:00 pm – 04:15 pm
Ashu Sharma	Order Reduction Of Nonlinear Parametrically Excited Structural Systems	04:15 pm – 04:30 pm
Lokesh Jogi Amar Gaonkar	Parametric Model Order Reduction Using Modified Component Mode Synthesis	04:30 pm – 04:45 pm
Paolo Maria Mariano Marco Spadini	Forced finite degrees of freedom dynamical systems with multiple memories: existence of periodic solutions	04:45 pm – 05:00 pm
Roy Choudhury	Perturbative and Reversible Systems Approaches to New Families of Embedded Solitons of a Perturbed Fifth-order KdV Equation	05:00 pm – 05:15 pm
Ranses Alfonso Rodriguez Roy Choudhury	Bifurcations and Dynamics of Coupled Mathieu-van der Pol Oscillators with Distributed Delay	05:15 pm – 05:30 pm
Giovanni Migliaccio Francesco D'Annibale Davide Bigoni Francesco Dal Corso	Dynamic Stability of Nonlinear Mechanical Systems Subject to Non-Holonomic Constraints	05:30 pm – 05:45 pm

MECHANICAL SYSTEMS AND SMART STRUCTURES II

ZOOM ROOM 4

<https://zoom.us/j/96267332790>

Chairs: Giovanni Migliaccio

Alessandro Porrari Ginevra Hausherr Luis Pedro Vieira Alexandrino Giulia Lanzara	An "Invisible" Piezoelectric Web for Detecting Structural Nonlinearities	04:00 pm – 04:15 pm
Paulomi Mukherjee Banamali Sahu A. Arockiarajan Shaikh Faruque Ali	Characterizing Bistable Laminate Using Acoustic Emission Data	04:15 pm – 04:30 pm
Junning Chen	Image-Based Modelling of Mouse Femoral Epiphysis Reveals Biomechanical Roles of Cellular Lacunar Gradients in the Absence of a Secondary Ossification Centre	04:30 pm – 04:45 pm

Abdullah Alshaya	Vibration Mitigation by Use of Viscously Damped Metamaterial Plate	04:45 pm – 05:00 pm
Ahmad Algara alessandro cabboi Jie Yuan	The Influence of Surface Roughness on Friction-Induced Vibration	05:00 pm – 05:15 pm
Giovanni Migliaccio Arnaldo Casalotti Francesco D'Annibale	Linear and Nonlinear Damping Destabilization in Non-Conservative Structural Systems	05:15 pm – 05:30 pm
Sandra Carillo Cornelia Schiebold	Fifth order nonlinear evolution equations: new and old invariances via Bäcklund transformations	05:30 pm – 05:45 pm

TUESDAY JUNE 24, 2025

PARALLEL SESSIONS

DAY 2 – Tuesday, June 24, 2025

10:45 am – 12:00 pm

CHAOTIC SYSTEMS AND UNCERTAINTY

ZOOM ROOM 1

<https://zoom.us/j/93081473628>

Chairs: Michele Bonnin, Tiago Carvalho

Muhammad Ali Qureshi	Electronics and Cryptography with Fractional Derivative Memristor based 4D Chaotic Flow	10:45 am – 11:00 am
Michele Bonnin Alon Ascoli Fernando Corinto Fabrizio Bonani R. Stanley Williams	Brownian Ratchets Revisited: Solving Brillouin Paradox in a Nonlinear Circuit via Stochastic Calculus	11:00 am – 11:15 am
Marcin Lawnik Nicolas Wardenga Lazaros Moysis George Fragulis	Soboleva Modified Hyperbolic Tangent Based Chaotification Method	11:15 am – 11:30 am
Antonio Zippo Francesco Pellicano	Complex Dynamic Phenomena in Shells with Random Excitation	11:30 am – 11:45 am
Alexandra Choumpaev Lazaros Moysis Marcin Lawnik George Fragulis Christos Volos	A Review of Chaotic Behavior in High Temperature Superconducting Magnetic Levitation Systems	11:45 am – 12:00 pm

AI AND ML 2

ZOOM ROOM 2

<https://zoom.us/j/96467109733>

Chairs: Tieding Guo

Sitai Zhao Tieding Guo Fangyan Lan Rui Yi	Data-Driven Discovery of Sparse Slow Dynamics of Nonlinear Systems	10:45 am – 11:00 am
Yasai Nie Tieding Guo	Is single-mode approximation safe for cubic (nonlinear) structures?	11:00 am – 11:15 am
Meiyazhagan Jaganathan Vikram Pakrashi Aasifa Rounak	Data-driven Chatter Vibrations and Parameter Discovery in the Frictional and Regenerative Metal Cutting using Physics Informed Neural Networks	11:15 am – 11:30 am
Ayush Gupta Vipin Agarwal	Attention-Based Forecasting of Transient Dynamics in Nonlinear Systems	11:30 am – 11:45 am
Rui Yi Tieding Guo	A deep learning approach for reduced-order modelling of nonlinear structures	11:45 am – 12:00 pm

DAY 2 – Tuesday, June 24, 2025

10:45 am – 12:00 pm

METAMATERIALS 1

ZOOM ROOM 1

<https://zoom.us/j/97332192433>

Chairs: A K Tiwari, Harry Leitch

A K Tiwari S H Upadhyay Tanmoy Mukhopadhyay	Nonlinear Propagation of Solitary Wave in a Tubular Origami Designed Metamaterial: An Idealized Elastic Model	10:45 am – 11:00 am
Mingchao Liu	Adaptive Folding Matter: From Natural Morphogenesis to Tunable Meta-Ribbons	11:00 am – 11:15 am
Abdallh Ismail Herbawi Shirong Huang Leif Riemenschneider Ebru Cihan Gianaurelio (Giovanni) Cuniberti	Miniaturized Inkjet-Printed Graphene-Based Gas Sensors for Environmental Monitoring	11:15 am – 11:30 am
Harry Leitch Olivia Stodieck Jie Yuan	Non-linear flutter analysis of tow-sheared composite wing	11:30 am – 11:45 am
Anandamoy Mukhopadhyay Symphony Chakraborty	Effect of Heat Flux and Exponential Viscosity Variation on the Stability of Thin Liquid Films over Cylindrical Substrates	11:45 am – 12:00 pm

MULTIFUNCTIONAL STRUCTURES

ZOOM ROOM 4

<https://zoom.us/j/95220243379>

Chairs: Jingzhong Tong, Qicheng Zhang

Lingqi Wang Jingzhong Tong Zhangsheng Pan Jiajia Shen	Poisson's Ratio Control in Auxetic Metamaterials Under Large Tensile Strains	10:45 am – 11:00 am
Zhangsheng Pan Lingqi Wang Jingzhong Tong Jiajia Shen	Re-programmable energy dissipation mechanical metamaterial struts via elastic tailoring	11:00 am – 11:15 am
Kai Wang Xizheng Fang Yang Liu Jiajia Shen	Elastic and Stiffness Tailoring of 3D Dome Structures for Recoverable Energy Dissipation Metamaterials	11:15 am – 11:30 am
Zhenyao Zhao Dayi Zhang Qicheng Zhang	Mechanical Properties of the Rotor Support Structure with Tunable Stiffness	11:30 am – 11:45 am
Maria Rosaria Marsico Julian Londono Monsalve	An experimental study on the sensing capability of functionalized textile reinforcing recycled polymers	11:45 am – 12:00 pm

DAY 2 – Tuesday, June 24, 2025

10:45 am – 12:00 pm

ROBOT DYNAMICS AND CONTROL II

ZOOM ROOM 5

<https://zoom.us/j/98619624811>

Chairs: Ali K. hoshiar, Yao Yan

Ti Chen	Dynamics and control of a flexible beam with moving actuators	10:45 am – 11:15 am
Yaqiang Wei Hao Wen	Dynamic modeling and coordinated control of a dual-arm space robot with flexible appendages on SE(3)	11:15 am – 11:30 am
Shaoyi Lu Jingtian Chen Huifang Li Li Zhang	A switched control strategy in human balance	11:30 am – 11:45 am
Zhengtao Wei Ti Chen Hao Wen Dongping Jin Haiyan Hu	Fast motion planning and control of self-assembly for multiple spacecraft	11:45 am – 12:00 pm

DAY 2 – Tuesday, June 24, 2025

01:30 pm – 03:30 pm

NONLINEAR VIBRATION CONTROL

ZOOM ROOM 1

<https://zoom.us/j/93202931576>

Chairs: Athanasios Tsetas

Andrei Faragau Athanasios Tsetas Apostolos Tsouvalas Karel van Dalen Andrei Metrikine	Leveraging nonlinearity for enhancing metamaterial performance: application to environmental noise and vibration in two civil engineering applications	01:30 pm – 01:45 pm
Chnunyan Zhou	An Integrate 3-DOF Adjustable QZS Vibration Isolation System with High-Order Stability	01:45 pm – 02:00 pm
Menna El-Masry Ayman El-Badawy	Kalman Filter based Sliding Mode Control of a Rotating Smart Beam with End Mass	02:00 pm – 02:15 pm
Pramod Kumar Verma V Shrikanth Gopal Krishna Kamath	Negative Stiffness Mechanism with Hereditary Damping	02:15 pm – 02:30 pm
Kehinde A. Omoteso Sumayyah Adejoke Dhikirullah Taiwo O. Roy-Layinde Oliver Ozioko Uchenna Diala John A. Laoye	The Effect of Negative Stiffness on Vibrational Resonance in Vibration Isolation System	02:30 pm – 02:45 pm
T. Elizabeth Jeyanthi Ju H. Park K. Mathiyalagan	Stabilization of Time Delayed Stochastic Jump Discontinuous Systems Driven by Poisson Noise	02:45 pm – 03:00 pm
Husain Kanchwala Anish Kumar Soumyabrata Maiti	Effects of Strong Friction and Stiffness Nonlinearities on Vibrations and Control of a Cantilever-Based Disc Brake Caliper Model	03:00 pm – 03:15 pm
Meiyu Zheng Rui Peng Luyi Tang Zhilin Huang Mary Lanzerotti Harrish Joseph Walter Lacarbonara	Characterization of a Hoisting Device using Variable Length Control and Real-Time Gyroscopic Data	03:15 pm – 03:30 pm

NONLINEAR PDEs AND ODEs

ZOOM ROOM 2

<https://zoom.us/j/96874422716>

Chairs: Csanád Árpád Hubay

Csanád Árpád Hubay Tamás Kalmár-Nagy	Investigation of Degenerate Equilibria via Carleman Linearization	01:30 pm – 01:45 pm
Sanketh Tonannavar V Shrikanth KRY Simha	Predicting heteroclinic bifurcation from modified fractional Hunt-Crossley equation	01:45 pm – 02:00 pm
Huimin YIN Kwok Wing Chow	Nonlinear Wave Propagation for Nonlinear Schrödinger Equations in an Inhomogeneous Medium: Applications to Coastal Engineering	02:00 pm – 02:15 pm
Neelam Yadav Triveni Prasad Shukla	Propagation of Dispersive Shock Wave in Hall-Magnetohydrodynamic model in non-ideal fluids	02:15 pm – 02:30 pm
Marcelo V. Flamarion	Particle paths beneath nonlinear waves	02:30 pm – 02:45 pm
Roberto Guzman Desiderio Vasquez	Nonlinear Autocatalytic Reaction Fronts With Convection and Heat Losses	02:45 pm – 03:00 pm
Rahil Valani	Attractor-Driven Matter	03:00 pm – 03:15 pm
Tiago Carvalho Jackson Cunha Bruno Freitas	Canonical Forms of 3D Cusp-Fold Singularities and its Unfolding	03:15 pm – 03:30 pm

WEDNESDAY JUNE 25, 2025

PARALLEL SESSIONS

DAY 3 – Wednesday, June 25, 2025

11:00 am – 12:30 pm

BIO/ECOSYSTEM DYNAMICS

ZOOM ROOM 1

<https://zoom.us/j/97072217627>

Chairs: Tiago Carvalho

Thoa Thieu Roderick Melnik	A Stochastic Nonlinear Dynamical System for Smoothing Noisy Eye Gaze Data	11:00 am – 11:15 am
Fathalla Rihan	Qualitative and Quantitative Features of Delay Differential Equations with Biological Systems	11:15 am – 11:30 am
Georges Sarafopoulos Despoina Terzopoulou Kosmas Papadopoulos	Dynamics and Chaos Control of a Cournot Game with Heterogeneous Expectations, Asymmetric Information and Social Welfare	11:30 am – 11:45 am
Sergiu-Adrian Folta Eva Kaslik	A Comparison of Nonlinear Dimensionality Reduction Algorithms Applied on Alzheimer MRI	11:45 am – 12:00 am
Protyusha Dutta Guruprasad Samanta	Analysis of epidemic dynamics: Incorporating PRCC in SIRS model with control strategies and environmental fluctuations	12:00 pm – 12:15 pm

MECHANICAL SYSTEMS AND STRUCTURES IV

ZOOM ROOM 2

<https://zoom.us/j/91382317007>

Chairs: Daniele Zulli, Chiara Bedon

Pankaj Kumar S. Narayanan Piyush Shaky	Rub Related Nonlinear Dynamics in a Noisy Non-Smooth Jeffcott Rotor Model	11:00 am – 11:15 am
Davide Pavesi Riccardo Nastri Stefano Zoia Alessio Colombo Pietro Peliti Gabriele Gattere Luca G. Falorni Giacomo Langfelder Valentina Zega	Understanding the Dual Foucault Pendulum MEMS gyroscope nonlinear dynamics	11:15 am – 11:30 am
Kerou Liu Yufei Chen Mu Li Hao Wang Weiwei Hao Hui Zhang Yi Yang Yafei Li	Study on the dynamic anti-deviation characteristics and laws of the double-stabilizer pre-bending drilling assembly	11:30 am – 11:45 am
Chiara Bedon Martina Sciomenta Alessandro Mazelli	Experimental Calibration of a Biodynamic Spring-Mass-Damper Pedestrian Model and Application to Timber Floors	11:45 am – 12:00 am
B Shayak	Normal Modes in a Closed Form Aircraft Dynamic Model	12:00 pm – 12:15 pm
Arnaldo Casalotti Manuel Ferretti Angelo Luongo Daniele Zulli	Nonlinear Dynamics of Beam-Like Thin Tubes Considering Cross-Sectional Flattening and Longitudinal Stretch	12:15 pm – 12:30 pm

DAY 3 – Wednesday, June 25, 2025

11:00 am – 12:30 pm

ROBOT DYNAMICS AND CONTROL III

ZOOM ROOM 3

<https://zoom.us/j/91967866575>

Chairs: Ali K. hoshiar, Yao Yan

Petro Lizunov Olga Pogorelova Tetyana Postnikova	Comparative analysis of performance of single-sided and double-sided vibro-impact dampers	11:00 am – 11:15 am
Petar AVRAMOV Marcin Kapitaniak Sumeet S. Aphale Vahid Vaziri	Delay Effects on Self-Balancing Robot Stability	11:15 am – 11:30 am
Joseph Paez Chavez Yao Yan Jiajia Shen Yang Liu	Harmonically excited capsule robot with nonlinear von Mises truss	11:30 am – 11:45 am
Chuang Wu Thomas Hill Chongjing Cao	Nonlinear Dynamics of the Dielectric Elastomer Actuator Driven Vibro-impact Capsule Robot	11:45 am – 12:00 am
Zhou Yang Ti Chen	Dynamics of flexible body with moving control moment gyros	12:00 pm – 12:15 pm
Zepeng Wang Yang Liu	Dynamics of Vibro-Impact Capsules in Heterogeneous Intestinal Fluid Environments	12:15 pm – 12:30 pm

MECHANICAL SYSTEMS AND STRUCTURES V**ZOOM ROOM 4**<https://zoom.us/j/93867642954>

Chairs: Uchenna Diala, Xuyuan Miao

Rashi Aditi Ranjan Somnath Sarangi	Nonlinear Dynamics of Soft Actuator: Elastomer-Electrode Stiffness Interactions	11:00 am – 11:15 am
Sandeep Reddy Basireddy Santosha Dwivedy Antara Sarkar	Nonlinear Control of Marine Surface Vehicles without velocity measurement	11:15 am – 11:30 am
Michele Bonnin Kailing Song Fabio Traversa Fabrizio Bonani	Particle swarm optimization of a multi DOF nonlinear energy harvesters for ambient mechanical vibrations	11:30 am – 11:45 am
Uchenna Diala Godwin Sani Paul Wood	Dynamic Analysis of a Dual Function Nonlinear Base-Excited Vibration Isolation and Energy Harvesting System for Rail Applications	11:45 am – 12:00 am
Xuyuan Miao Xuefeng Wang Caishan Liu	Study on Bicycle Self-Stabilization Mechanism by Dynamic-and-Data-Driven Surrogate Modelling	12:00 pm – 12:15 pm
Yikai Zhang Andrea Cammarano Hilde Metzger Paul Prentice	Comparison of a Ramping and Steady State Excitation on the Bifurcation Structure of a Multi-bubble System	12:15 pm – 12:30 pm

DAY 3 – Wednesday, June 25, 2025**11:00 am – 12:30 pm**

MECHANICAL SYSTEMS AND STRUCTURES VI**ZOOM ROOM 5**<https://zoom.us/j/93289937998>

Chairs: Amal Z. Hajjaj, Piotr Skrzypacz

Piotr Skrzypacz	Generalized Analysis of Dynamic Pull-In for Singular MagMEMS and MEMS Oscillators	11:00 am – 11:15 am
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Quankun LI Ruixian Ma Siji Wang Heyu Hu Tianxiang Wang Heow Pueh Lee	Study on A Novel Nonlinear Vibration Feature- based Method for Fault Diagnosis in Ring-like Engineering Structures	11:15 am – 11:30 am
Satyam Bais Diptangshu Paul Jayaprakash K R	Vibrations of a Geometrically Nonlinear Rayleigh Beam in Contact with a Flat Surface	11:30 am – 11:45 am
Parasuramuni Naga Vishnu Jayaprakash K R	Vortex Induced Vibrations of Piecewise Linear Oscillator	11:45 am – 12:00 am
Xiaobo Lei Quankun LI Ruixian Ma Siji Wang Heyu Hu Tianxiang Wang	Experimental Study on Dynamic Characteristics of a Geared Turbo Fan Engine Rotor System	12:00 pm – 12:15 pm
Zhengliang Fang Amal Z. Hajjaj Stephanos Theodossiades	Experimental insight into nonlinear dynamics of asymmetric weakly coupled micromachined resonators	12:15 pm – 12:30 pm